3.4 Groundwater Resources

The following groundwater analysis is based on the *Groundwater Resource Evaluation* prepared by Wiedlin & Associates, Inc. (W&A). The evaluation is based on Appendices F-1 through F-3 of this EIR.

3.4.1 Existing Conditions

Physical Setting

Topography

Peaceful Valley Ranch (PVR) lies within a 4,300-acre watershed whose northern (upstream) boundary is north of Skyline Truck Trail, at an elevation of about 2,100 feet above mean sea level (ft msl). The watershed drains southwestward via a series of canyons that merge into ephemeral creeks upstream and downstream of PVR. The eastern and western boundaries of the watershed are defined by secondary northeast–southwest trending ridges. The western ridge peaks at an elevation slightly greater than 1,500 ft msl. The eastern ridge is more prominent and peaks at an elevation of about 2,300 ft msl. The southern boundary of the watershed is defined by the confluence of the two ephemeral creeks that drain the PVR site.

The PVR site ranges in elevation from approximately 1,108 to 828 ft msl. The site has two small drainage basins. The western basin is rolling hillside terrain with vertical relief between the peaks and valleys generally less than 50 feet. An ephemeral creek that parallels SR-94 drains this portion of the property. An elongated centrally located basin with an ascending hillside terrain to the east, west, and north characterizes the eastern portion of the site. This broader and lower eastern basin is drained by a larger, southward trending, intermittent creek.

The southern boundary of the project site is approximately 1.3 miles north of the southern boundary of the watershed. From the northern boundary of the site to the southern boundary of the watershed (study area), the valley floor slopes southward at a grade of approximately 1.3 percent.

Climate

Climate affects groundwater resources in terms of annual rainfall and evapotranspiration within the watershed. The County of San Diego (County) Draft Precipitation Map indicates that the watershed has an average annual rainfall of 15 to 18 inches over a 30-year period of record. Long-term rainfall data for the Jamul area is best represented by the Dulzura Summit Rainfall Station, located about nine miles southeast of the site at an elevation of about 1,500 feet. The rainfall station records have monthly rainfall totals since 1969. Potential evapotranspiration (PET) rates have been assessed by regional data provided by the California Irrigation Management Information System (CIMIS). CIMIS has created a statewide PET map that comprises 18 evaporative zones. The study area is in Zone 9, which has, on average, about 55 inches of PET per year; refer to Table 3.4-1.

Land Use

There are currently approximately 835 parcels within the watershed, according to a SanGIS database search. A count of rooftops on a recent aerial photograph indicates approximately

560 structures within the watershed. The Otay Water District (OWD) reports that there are 533 water meters within the watershed boundaries. Based on this information, approximately 95 percent of the developed parcels within the watershed receive water from OWD.

Within the OWD's service boundaries, approximately 47 of the 835 parcels in the watershed cannot receive imported water because their elevation is too high to receive adequate water pressure from the existing water storage tanks; refer to Figure 3.4-1. Additionally, there may be other parcels that do not have water service because of the cost of delivering service to a relatively remote parcel or because the owner has elected not to obtain water service.

There are several parcels adjacent to Peaceful Valley Ranch that are within the OWD but do not currently receive imported water service, as the planned pipelines serving these parcels have not yet been constructed.

Existing Geology

There are numerous drainages in the Jamul area, including those beyond the limits of the immediate watershed, that trend in a northeast–southwest direction. This drainage pattern may represent underlying geologic structures such as fracture zones or pluton contacts (underground crystallized molten rock coming into contact with a different mineral type of crystallized molten rock) where the rock is more susceptible to weathering and erosion. In fact, within the eastern drainage basin near the proposed equestrian polo field, exposures of different rock types (diorite and gabbro) are evident. Through preferential erosion where the crystalline rock is more weathered, drainages have become aligned, over geologic time, with the regional structure. Groundwater storage and flow rates within the underlying bedrock are likely to be greater in these areas due to higher secondary porosity and higher permeability in the fractured zone.

Existing Water Wells

Four production wells, (PV-1, PV-2, PV-3, PV-4) currently exist at Peaceful Valley Ranch; refer to Table 3.4-2 and Figure 3.4-2. Installation dates are not known, but all four wells are weathered and are probably more than twenty years old, based on anecdotal evidence from the previous property owner. Well PV-1 is currently controlled by the prior owner and continuing resident of the existing ranch house at Lot 5 under a Life Estate agreement. That well is currently used for both domestic potable and irrigation uses at the existing ranch house. Well PV-2 is not active, but is a proposed groundwater level monitoring well. Well PV-3 is not active, and is proposed to be destroyed. Well PV-4 is the existing well proposed for continuing groundwater production. In addition to the foregoing, a fifth production well (PV-5 located on proposed Lot 42) also exists on the property, but is under the separate ownership and operation of a non-related, offsite single-family residence adjacent to the property. The well and waterline to this offsite residence are within an existing easement to the benefit of that offsite property. The alignment of that existing waterline and easement will be relocated as shown on the project tentative map.

Nine observation wells, OW-1 through OW-9, have been installed to depths ranging from 26 feet to 83 feet; refer to Table 3.4-2 and Figure 3.4-2. Observation wells OW-1, 7, 8, and 9 actually encounter groundwater. The remaining observation wells are completed above the water table, but provide control on the maximum water table elevation. Septic exploration borings C, D, E, and J encounter the regional water table, at least seasonally, and are used to evaluate groundwater elevation.

Existing Groundwater Quantity

Sources

The sources of groundwater in the PVR watershed are rainfall that has percolated through the soil to the water table and imported water from OWD that reaches the water table via septic leach fields and percolation of excess irrigation water. The current estimated annual rate of groundwater recharge in the watershed from rainfall and leach fields supplied with OWD water is 320 to 510 acre-feet. Recharge from OWD-supplied irrigation has not been estimated because of the variables associated with the different uses of each homeowner and the extent to which they would irrigate their own land. Groundwater flow through the moderately fractured rock aquifer at the site is approximately 250 to 590 acre-feet per year. In the absence of groundwater pumping in the watershed, the average annual recharge rate and the rate of groundwater flow should be approximately the same. Since approximately 95 percent of the properties within the watershed have access to OWD water, groundwater production is minimal. These two separate analyses of regional groundwater recharge and groundwater flow through the project site both indicate that hundreds of acre-feet of groundwater flow occur within the watershed and beneath PVR.

Demand

Approximately 95 percent of the properties within the watershed have access to OWD water. There are approximately 50 parcels in the watershed that are groundwater-dependent. Assuming a consumptive water use of 0.5 acre-feet per year per parcel, groundwater lost from the watershed is approximately 25 acre-feet per year. Any subdivision of those parcels resulting in an expansion of groundwater use would require review and approval by the County, pursuant to the County's groundwater ordinance. There are no groundwater-intensive uses such as golf courses or large-scale agricultural operations within the watershed.

Existing Groundwater Recharge

Groundwater flowing through PVR has been sustained by the infiltration of precipitation, infiltration of surface water along ephemeral and intermittent creek beds, and percolation of imported water in the form of septic leachate and excess irrigation.

The United States Geological Survey (USGS) estimated groundwater recharge from rainfall at 0.11 feet per year in the Lee Valley watershed of Jamul in 1988. During this year, approximately 19.5 inches of precipitation fell in the watershed and approximately 7 percent reached the water table (USGS, Open File Report 90-592, 1991). The percentage of rainfall that reaches the water table will vary, depending upon the amount and intensity of rainfall and the amount of available groundwater storage. Average annual rainfall in Jamul ranges between 15 and 18 inches (San Diego County Precipitation Map, 2004). Assuming 7 percent of the low end of the rainfall range of 15 inches yields 0.088 feet of annual rainfall recharge to the water table; across the 4,300-acre watershed, approximately 375 acre-feet of groundwater recharge occurs per year on average. Since the aquifer underlying the watershed comprises primarily fractured igneous rock, groundwater storage capacity can sometimes be less than the amount of water available to recharge the aquifer. This condition may occur in high rainfall years or when high rainfall years occur sequentially. Therefore, average annual groundwater recharge from rainfall for the watershed is conservatively estimated to range between 190 and 375 acre-feet per year; refer to Table 3.4-3.

Groundwater recharge within the watershed is significantly augmented by OWD's water service through infiltration of septic leachate to the water table. Census information from 2000 indicates that an average of 3.5 people reside in each dwelling unit within the census tracts that include the watershed. Assuming water conservation fixtures are in place, the California Department of Water Resources estimates that domestic water consumption averages approximately 70 gallons per day per person. Assuming that 90 percent of this water is disposed of through septic leach fields, approximately 0.25 acre-feet of water per year is recharged to the groundwater table. According to the San Diego State University groundwater modeling analysis, included in Appendix F, 90 to 99 percent of leachate per household reaches the water table (under soil conditions conducive for successful leach fields). This estimate of recharge does not include additional contribution from irrigation.

Recharge attributable to imported water is estimated to occur at 533 metered locations within the watershed at a rate of 0.20 to 0.25 acre-feet per year per meter. Therefore, recharge from OWD water service within the watershed is estimated to be 120 to 132 acre-feet per year, depending upon evaporative losses of septic leachate. The combined recharge from rainfall and septic leachate results in annual recharge to the watershed that ranges from approximately 320 to 510 acre-feet.

Groundwater Level Fluctuations

Depth to groundwater has been measured at the site for approximately one year. Water level measurements were taken in February, June, and November 2004, as well as in January and February 2005. Depths have been converted to groundwater elevations based on surveyed elevations of measuring point elevations. Groundwater level hydrographs for selected onsite wells have been prepared for this data set; refer to Figure 3.4-3. Additionally, groundwater levels from four selected non-pumping wells in DPLU's groundwater database have been evaluated to assess the historic range in groundwater levels. These wells are located within Jamul, outside of the PVR watershed; refer to Figure 3.4-4. Groundwater depth measurements were generally taken three months apart. The period of record for the DPLU data is 10 to 23 years; refer to Figure 3.4-5. Site-specific hydrographs and Jamul area hydrographs are plotted at the same time scale to facilitate comparison of water level fluctuations over time.

Existing Groundwater Quality

Groundwater quality has been assessed at the site with respect to nitrate and total dissolved solids (TDS). Groundwater samples have been collected at several wells and borings, including wells PV-1 through PV-4, observation well OW-7, and septic exploration boring J; refer to Table 3.4-4. While conducting step drawdown tests in September and October 2003, Earth Tech collected groundwater samples at the test wells. Groundwater samples were collected in June 2004 and January 2005 by W&A at several wells and borings. A detailed assessment of this work through the June 2004 sampling round was presented to the County

Department of Environmental Health in October 2004 and updated in October 2005 (W&A, 2005). The result of this groundwater sampling is located in Appendix F.

Nitrate concentrations in groundwater have approached or exceeded drinking water standards at locations adjacent or downgradient of the former organic farm operation at the site. At the center and downgradient locations, nitrate concentrations from samples collected in June 2004 typically approached or exceeded the MCL of 10 mg/L. This is most probably attributable to the former operations of the organic farm located at the site. The three-acre organic farm, which had been operating for five years before its voluntary permanent termination of operations in August 2004, was located in the area designated for the polo equestrian field. The farm reportedly used a high-potency, kelp-based fertilizer in its operations.

The highest nitrate concentration in groundwater was observed at PV-3, a large diameter hand-dug well. It is assumed that nitrate concentrations are greatest at this location due to the decay of organic debris that often accumulates in large diameter wells. However, elevated nitrate concentrations at PV-1, PV-4 and OW-7 indicate that there is probably more than a single point of source of nitrate at this site. Elevated nitrate concentrations are consistent with the location of a 3-acre organic farm that operated on the site for the past five years. The organic farm terminated operations permanently in August 2004.

Nitrate concentrations, reported in the form of nitrogen, ranged from below the laboratory detection limit of 0.05 milligrams per liter (mg/L) at well PV-2 in January 2005 to 13.2 mg/L at the large-diameter, hand-dug well PV-3 in June 2004; refer to Table 3.4-4. Overall, nitrate concentration in groundwater samples collected at wells at the upgradient end of the site are lower than groundwater samples collected from wells at the center and downgradient portions of the site.

Groundwater samples collected at PV-4 during the 53-hour constant discharge test indicate a consistent nitrate concentration of approximately 10 to 11 mg/L and a consistent TDS concentration of approximately 1,060 mg/L. Both constituents are above their respective drinking water standards, as described in Section 3.4.3.

Existing Regulations

County Groundwater Ordinance

The County Code (Title 6, Division 7, Chapter 7 [a.k.a. "Groundwater Ordinance"]) requires that a groundwater investigation be prepared for specified discretionary projects proposing to use groundwater. The purpose of the investigation is to determine whether existing groundwater basins have an adequate supply to accommodate the proposed use. The intent of the Code is to protect other groundwater-dependent uses within the same groundwater basin, and provide specific direction on the preparation and review of the groundwater investigation.

3.4.2 Guidelines for the Determination of Significance

Significance guidelines to define significant impacts to offsite domestic wells and to onsite and offsite groundwater-dependent sensitive vegetation have been established. To ensure the guidelines are accurate and effective tools in determining impacts to groundwater resources the first two guidelines were developed in conjunction with DPLU groundwater hydrologists and the third guideline was derived from County Standards for Site Specific Hydrogeologic Investigations (a supplement to the County's Groundwater Ordinance). These guidelines have been recognized by DPLU as effective screening tools in determining impacts to offsite domestic wells and to onsite and offsite groundwater-dependent sensitive vegetation. These guidelines are effective because they cover a range of possible scenarios where impacts to groundwater quantity could be affected by the proposed project. A significant impact would occur if the proposed project would exceed the guidelines below:

- For impacts on offsite domestic supply wells, a significance guideline of 20 feet of drawdown, resulting from groundwater pumping at PVR, has been established to assess the significance of potential impacts on domestic water supply.
- For impacts on groundwater-dependent vegetation, a significance guideline of 3 feet of drawdown, resulting from groundwater pumping at PVR, has been established to assess the significance of potential impacts to plant vitality.
- Groundwater storage reduction shall not exceed 50 percent of the maximum aquifer storage capacity.

Significance guidelines to define significant impacts on groundwater quality as a result of the proposed use of groundwater have been established. To ensure the guidelines are accurate and effective tools in determining impacts to groundwater quality, the first significance guideline is derived from the State standards for drinking water for maximum contaminant level (MCL) and the second significance guideline is derived from the State standards for drinking water for total dissolved solids (TDS). These guidelines have been included in the State standards for drinking water because they are effective screening tools in determining impacts to groundwater quality. These guidelines are effective because they cover a range of possible scenarios where groundwater quality could be affected by the proposed project. A significant impact would occur if the proposed project would exceed the guidelines below:

- Significant impacts on groundwater quality would occur if onsite concentrations of nitrate (as N) in groundwater samples exceed the MCL of 10 mg/L.
- Significant impacts to groundwater would occur if onsite concentrations of TDS in groundwater samples exceed the drinking water standard of 1000 mg/L.

3.4.3 Analysis of Project Effects and Determination of Significance

Groundwater Quantity

Sources

The sources of groundwater in the PVR watershed are rainfall that has percolated through the soil to the water table and imported water from OWD that reaches the water table via septic leach fields and percolation of excess irrigation water from offsite land uses. The current estimated annual rate of groundwater recharge in the watershed from rainfall and leach fields supplied with OWD water is 320 to 510 acre-feet. Recharge from OWD-supplied irrigation has not been estimated, due to the many different variables associated with the irrigation practices of each property owner. Groundwater flow through the moderately fractured rock aquifer at the site, to a total depth of 136 feet, is approximately 250 to 590 acre-feet per year. In the absence of groundwater pumping in the watershed, the average annual recharge rate and the rate of groundwater flow should be approximately the same. Approximately 95 percent of the property within the watershed has access to OWD water. No groundwater-intensive uses such as golf courses or large agricultural operations currently exist within the watershed. The proposed project would not alter the groundwater sources. The project would continue to import water from OWD, and rainfall and excess irrigation would continue to percolate through the soil. Therefore, potential impacts on the groundwater sources from the proposed project would be less than significant.

Demand

To assess the potential impacts from groundwater production at the project site, the groundwater demand and the predicted groundwater recharge levels were calculated. Based on water demand numbers developed for OWD’s service of the proposed development, the project is expected to require 153 acre-feet of water per year, as shown in Table 3.4-5. The OWD has general guidelines that indicate that water use in park-like settings similar to the proposed 12.8-acre polo field may require 32 acre-feet of water per year. This is included in the 153 acre-feet water demand for the whole project, as itemized in Table 3.4-5. The polo field would be the only portion of the project using groundwater as a water supply source.

To provide a conservative approach to groundwater production, the maximum amount of groundwater that would be used for the 12.8-acre field would be voluntarily limited to 22.2 acre-feet of groundwater per year. This limit was arrived at by calculating groundwater recharge from the proposed project. Calculations of total water demand, from OWD and groundwater sources, as well as calculations of total project groundwater recharge, as shown in Table 3.4-5, show that the combined recharge from the polo field and septic portion of the project would be 22.2 acre-feet per year. Any additional irrigation requirements above 22.2 acre-feet would be supplied by an OWD water connection.

To ensure that a production limit of 22.2 acre-feet is adhered to, the following design measures will be made conditions of approval for the Major Use Permit (MUP) required for the equestrian center. The specific actions are further defined in the groundwater monitoring and mitigation plan located in Appendix A of Appendix F.

1. Install a cumulative flow meter at well PV-4 and record water usage monthly.
2. Every month, measure water levels at wells PV-2, PV-4, and PV-6.
3. Destroy wells PV-1 (once the Dedrick’s Life Estate Agreement has ended), PV-3 and OW-1 through OW-9 following the guidance for well destruction in the DEH *Site Assessment Manual*.
4. Prepare and submit to DPLU an annual groundwater monitoring report due within 28 calendar days after the end of the annual monitoring period.
5. The annual monitoring plan, found in Appendix A of Appendix F of this report, shall include groundwater production and groundwater level data and will document shutdowns in groundwater production induced by groundwater levels dropping below the biological groundwater guideline. The plan will also evaluate whether groundwater production is in compliance with the restriction that production not

exceed development-induced groundwater recharge, as calculated using the method summarized in Table 3.4-5. The report will include an estimate of project development-induced groundwater recharge based on an inventory of what parcels have been developed and are using OWD water.

The frequency and area extent of groundwater level monitoring are estimated based on non site-specific experience. Once monitoring data has been collected for a minimum of one year, revisions in the monitoring and mitigation program may be advisable and may be implemented at the discretion of the DPLU director.

Groundwater Drawdown Analysis

Using the proposed 22.2 acre-feet limit to groundwater production, a 53-hour pump test was conducted to calculate the effects of the proposed 22.2 acre-feet limit to groundwater drawndown to offsite wells. The pump test was conducted from February 15 to February 17, 2005, and groundwater level recovery was monitored from February 17 to February 21. Pumping was conducted at well PV-4, the proposed irrigation well for the equestrian polo field, at a rate of 42 gallons per minute (gpm). Groundwater levels were monitored at 13 wells and borings located on and off the property. The test was conducted in accordance with the methods described in the aquifer test work plan submitted to and approved by DPLU (W&A, April 2005). During the test and prior to the conclusion of the test, water level measurements were conducted at each of observation and monitoring wells. Observation of water levels at the monitoring wells showed no drawdown of groundwater levels. Graphs used to show final measurements are located in Appendix F. Observation of water levels at the 13 observation wells showed no drawdown of groundwater levels; refer to Appendix F. After 53 hours of pumping, the pump was turned off and water level measurements were made in the test well to see how quickly the water level returned to pretest levels. This site-specific information was used to determine the transmissivity (permeability and thickness), of the aquifer. Transmissivity is an important variable in calculating the extent of groundwater drawdown that will occur in response to the proposed groundwater pumping.

The following calculation of groundwater drawdown induced by project pumping relies on the Cooper-Jacob approximation of the nonequilibrium flow equation (Freeze and Cherry, 1979):

$$s = \frac{264Q}{\text{pi } T} \log \frac{0.3Tt}{r^2 S}$$

Where:

- s = groundwater drawdown (feet)
- Q = pumping rate (gallons per minute)
- T = transmissivity (gallons/day*foot)
- t = time since pumping began (days)
- r = distance from pumping well (feet)
- *S* = groundwater storage coefficient (dimensionless)

As shown in Table 3.4-6, eight drawdown estimates have been calculated based on varying the assumption of values for the pumping rate (Q), the duration of pumping (t), the transmissivity of the aquifer (T), and the groundwater storage coefficient (*S*). For each estimate, drawdown has been calculated at distances of 100, 180, 200, 300, 500, 800, 1,000, 1,500, and 3,000 feet from the pumping well.

The combination of two pumping scenarios, two transmissivity values, and the two storage coefficient values yield eight estimates of drawdown at varying distances from well PV-4; refer to Table 3.4-6. At a distance of 1,500 feet, a distance slightly closer than the distance between well PV-4 and the nearest residential property that is dependent on groundwater for domestic potable use, the, estimated drawdown ranged from 1.9 feet to 0.6 feet depending upon the assumptions used. In all eight calculations, estimated drawdown is less than the domestic well groundwater guideline of 20 feet at the residential properties that are dependent on groundwater for domestic potable use. As such, the proposed project is consistent with the first significance criteria. Therefore, potential impacts on groundwater supply are considered to be less than significant.

Impact 3.4.3-1: The same drawdown analysis indicates that depending upon the drawdown calculation assumptions, approximately 0.9 to 3.3 feet of drawdown will occur at the nearest groundwater sensitive habitat. This habitat is located approximately 215 feet southwest and down gradient of well PV-4; refer to Figure 3.1-3. A significance criteria of three feet of drawdown at groundwater sensitive habitats has been established to protect the vitality of the habitats. Under some of the assumed conditions, drawdown exceeded the significance criteria of three feet of drawdown near a groundwater sensitive habitat. Therefore, if project-related groundwater drawdown exceeded the three feet significance criteria, a significant impact would occur.

The third significance guideline, based on the County Groundwater Ordinance, allows up to a 50 percent temporary reduction in maximum aquifer storage capacity in response to groundwater production. The proposed fully developed project will result in no overall decrease groundwater storage because groundwater production will be limited to the amount of groundwater recharge calculated to be induced by the importation of OWD water to the site. Therefore the proposed groundwater production will not result in storage reductions that will exceed the 50 percent threshold specified in the County Groundwater Ordinance. However, because groundwater recharge will be distributed across the site and groundwater pumping will be focused at well PV-4, some localized groundwater drawdown, and therefore groundwater storage reduction, will occur. However the proposed project will result in no overall decrease in maximum aquifer storage capacity storage because groundwater production will be limited to the amount of groundwater recharge calculated to be induced by the importation of OWD water to the site. As such the proposed project is consistent with the third significance criteria. Therefore, potential impacts on groundwater supply are considered to be less than significant.

Unlike groundwater recharge from rainfall, recharge from imported water will occur on a continuous basis because septic system and irrigation recharge from the new homes would occur throughout the year. Consequently, limitations on the groundwater storage capacity of the rock are not a factor in the availability of groundwater, because water would be added to the water table throughout the year and not on a seasonal basis. Onsite groundwater production will not be dependent on current groundwater resources. Even without the project-induced groundwater recharge that will occur at the site when imported water is delivered, regional groundwater water balance analyses, site-specific cross-sectional flow analyses, and a well-hydraulics-based drawdown analysis all indicate that there are sufficient groundwater resources available to sustain the proposed 22.2 acre-feet of annual pumping. Therefore, potential impacts on groundwater storage are less than significant.

Groundwater Quality

The State of California has two secondary drinking water standards for TDS: 500 mg/L and 1,000 mg/L. Drinking water that is below 500 mg/L is most ideal for drinking; drinking water that is between 500 mg/L and 1000 mg/L can be consumed, but the quality becomes compromised as TDS approaches 1,000 mg/L. If the TDS level is above 1000 mg/L the water should not be used for consumption. Most groundwater samples collected at the site approach or exceed the less stringent drinking water standard of 1,000 mg/L. TDS concentrations do not vary much spatially across the site, indicating there are no point sources of salts at the site. The low TDS concentrations observed in some samples collected in January are attributable to rainfall recharge. Elevated TDS concentrations at the site are most likely attributable to groundwater recharge from the hundreds of septic leach fields in the watershed. Because of this ongoing source of recharge and water degradation, it is likely that the improved TDS concentrations at wells OW-7, PV-2, and PV-3 are temporary.

Nitrate concentrations in groundwater samples collected at wells PV-1, PV-2, PV-3, and PV-4 in January and February 2005 declined, compared to concentrations in groundwater samples collected in June 2004; refer to Table 3.4-5. Since January, samples were collected during a major groundwater recharge season as reflected by an increase in groundwater levels of greater than 10 feet; dilution of nitrate in groundwater is consistent with this process. Nitrate concentrations in samples collected in January exceeded the MCL at wells PV-4 and OW-7. The decrease in nitrate levels, from absorption by plants and dilution from rainfall and groundwater recharge from the project, would result in a continued decrease in nitrate levels overtime. Nitrate and TDS concentrations in excess of their respective of MCL's are the result of former land use activities that are independent of the proposed project. Nitrate concentrations should decline over time as the mass of nitrate in soil is consumed by plants and diluted by rainfall recharge. The rate of decline will depend on how much nitrate remains in the soil and how much rainfall recharge will occur in the future. It is expected that the impact of fertilizers from the organic farm on groundwater quality will decline over time since no additional organic farm fertilizers will be added to the soil. As such, nitrate concentrations from the infiltration of septic leachate to the water table will result in nitrate concentrations below the MCL once the effects of the organic farm dissipate (Wiedlin & Associates, 2005).

Groundwater quality at the site, and most likely in the vicinity of the site, is poorly suited for domestic consumption. TDS concentrations typically exceed the secondary drinking water standard of 1,000 mg/L. The proposed project will limit the use of groundwater for irrigation only. All of the new homes will be served by imported water from OWD. Well PV-1 provides water to the Dedrick's home, the existing ranch house on Lot 5. Groundwater samples collected from well PV-1 exceeded the MCL for nitrate and TDS on two occasions, once in the fall of 2003 and once in the summer of 2004. In January of 2005, the groundwater sample collected from well PV-1 had nitrate and TDS concentrations below their respective MCLs. Per the life estate agreement the Dedrick's have with Peaceful Valley Ranch, LLC, the Dedrick's have the right to continued use of well PV-1 or may elect to connect to OWD water service. Peaceful Valley Ranch, LLC has notified the Dedrick's that nitrate and TDS concentrations in groundwater samples collected from well PV-1 have exceeded MCLs. Although the TDS concentrations would exceed the significance guideline of 1000 mg/L, the groundwater at the site will not be used for drinking water; instead, drinking water will be imported from OWD. Therefore, potential impacts to groundwater quality from excess levels of TDS are less than significant.

3.4.4 Cumulative Impact Analysis

Potential future land use within the watershed includes seven properties that are in process with DPLU and all are within the OWD service area; refer to Figure 3.4-6. Of these seven properties, six are expected to discharge wastewater to septic leach fields. The expected amount of wastewater generated for Site 1, Jamul Indian Village Casino Development project is not known. Site 4, a telecommunication facility, is not expected to generate wastewater, as water service is not required for the project. The remaining five properties that are expected to generate wastewater discharge are proposing a total of 102 residential parcels. The estimated wastewater discharge for those five properties is 22.2 acre-feet per year, assuming 0.25 acre-feet of wastewater per dwelling unit. Since all five of the projects are expected to have OWD service, groundwater use will be discretionary. The proposed development of the five projects will increase groundwater recharge in the watershed by approximately 19 to 25 acre-feet per year, based on the groundwater modeling analysis described in Appendix F. Future development of the watershed is not expected to impact groundwater supply because nearly all of the watershed has OWD service available.

As the basin is developed, the majority of properties will use imported water and will discharge wastewater via septic leach fields. Groundwater demand is not expected to increase significantly, and groundwater recharge will be further augmented by the increase in septic recharge. Therefore, there would be no significant impacts from the proposed cumulative projects.

3.4.5 Growth-Inducing Impacts

As discussed in Section 1.7 (Growth-Inducing Impacts) of this EIR, implementation of the proposed project would not result in growth-inducing impacts. The PVR development would not remove obstacles to population growth or encourage or facilitate other activities that could significantly affect the environment, either individually or cumulatively. Therefore, no growth-inducing impacts relating to groundwater resources would occur as a result of the proposed project.

3.4.6 Mitigation Measures

The following mitigation measure is proposed to mitigate the project's impacts associated with groundwater.

3.4.3-1: A groundwater level monitoring and mitigation program shall be established, consistent with Appendix A of the *Groundwater Resource Evaluation*, to tie groundwater production to groundwater drawdown at a monitoring well that shall be installed in the vicinity of the nearest groundwater dependent habitat. The owner of Lot 51 shall retain a hydrogeologist, certified by the State of California, to direct the groundwater monitoring program. The nearest groundwater dependent habitat, a solitary sycamore tree, is approximately 215 feet southwest of well PV-4 and downgradient from the well. A proposed monitoring well, PV-6, will be installed between the sycamore tree and the pumping well. The proposed monitoring well shall be located on the opposite, or east, side of the creek bed from the sycamore tree at the Hollenbeck Canyon Wildlife Area. The Hollenbeck Canyon Wildlife Area is managed by the California Department of Fish and Game (CDFG). Accordingly, the proposed well location shall be contingent on CDFG's authorization, timely response, and reasonable access and liability requirements.

Proposed monitoring well PV-6 shall be completed to a depth approximately 10 feet below the groundwater threshold, a depth of approximately 45 feet. The well may need to be completed using a combination of air rotary drilling and hollow stem auger methods. The well shall be completed to the standards defined in the San Diego County SAM Manual.

These specific actions are further defined in the groundwater monitoring and mitigation plan as defined in Appendix A of the *Groundwater Resource Evaluation* and include, but are not limited to the following measures:

- Install a cumulative flow meter at well PV-4 and record water usage monthly.
- Measure water levels at wells PV-2, PV-4, and the proposed well PV-6 every month.
- Prepare and submit to DPLU an annual groundwater monitoring report within 28 calendar days after the end of the annual monitoring period.
- The annual monitoring report shall include groundwater production and groundwater level data and shall document shutdowns in groundwater production induced by groundwater levels dropping below the biological groundwater threshold. The report shall also evaluate whether groundwater production was in compliance with the restriction that production will not exceed development-induced groundwater recharge as calculated using the method summarized in Table 3.4-4. The report shall include an estimate of project development-induced groundwater recharge based on an inventory of what parcels have been developed and are using OWD water.

3.4.7 Conclusions

Groundwater Quantity

Implementing the significance guidelines, design measures, and Mitigation Measure 3.4.3-1 as discussed above, would ensure that impacts on water quantity would be less than significant. With project implementation, some reduction in groundwater storage would occur; however, by implementing the measures included in the *Groundwater Mitigation and Monitoring Program*, groundwater use would be monitored to ensure that a reduction in groundwater storage level, caused by the proposed use of groundwater for irrigation purposes, would not exceed the 50 percent temporary reduction allowed by the significance guideline. Drawdown to groundwater would not exceed 20 feet. As there would be a potential for impacts to groundwater-dependent vegetation, and the significance guideline of three feet of drawdown, resulting from groundwater pumping at PVR, would potentially be exceeded, implementation of Mitigation Measure 3.4.3-1 would reduce potential impacts to less than significant. The observation well PV-6 would be monitored to measure groundwater elevation with respect to the biological threshold and, if the threshold was exceeded, production of groundwater would be halted until the water level remained above the limiting value for at least 30 consecutive days. Correspondence with the California Department of Fish and Game acknowledging the Department's willingness to provide the applicant opportunity and access to the proposed monitoring well is attached to Appendix A of Appendix F. As a result, compliance with the significance guidelines, implementing design measures, and Mitigation Measure 3.4.3-1, would reduce potential significant impacts on water quantity from the proposed project would be less than significant.

Groundwater Quality

The existing groundwater quality at well PV-1 includes nitrate and TDS concentrations that are in excess of their respective of MCL's. Elevated nitrate concentrations are most likely attributable to former on site land use activities that are independent of the proposed project. Elevated TDS concentrations are most likely attributed largely to wastewater disposal from septic leach field systems that occur universally throughout the watershed. The proposed project is not expected to increase nitrate concentrations above existing conditions. Nitrate concentrations will likely decline to below the MCL as the mass of nitrate left in the soil from the former land use activities is depleted from rainfall and irrigation infiltration. As such, there would be not significant impacts to nitrate concentrations in groundwater from the proposed project. The TDS concentration in septic discharge from the proposed project is not expected to exceed the observed TDS concentrations in groundwater flowing into the site. Further, TDS concentrations in groundwater typically exceed the MCL as groundwater flows into the project site, therefore the proposed project is not expected to have significant impacts to TDS concentrations.

Table 3.4-1
Average Monthly Reference Evapotranspiration
Zone 9

Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sep	Oct	Nov	Dec	Total
2.2	2.8	4.0	5.1	5.9	6.6	7.4	6.8	5.7	4.0	2.7	1.9	55.1

Source: From California Irrigation Management Information System Reference Evapo-Transpiration Map; www.cimis.water.ca.gov/cimis/images/etomap.jpg.

Table 3.4-2
Water Well and Groundwater Elevation Information

Well Identification	Function	Depth (feet)	Casing Stickup (feet)	Depth to Water[1] 9/16/03	Depth to Water[1] 2/27/04	Depth to Water[1] 6/21/04	Depth to Water[1] 9/24/04	Depth to Water[1] 11/11/04	Depth to Water[1] 1/27/05	Depth to Water[1] 2/21/05	Depth to Water[1] 4/6/05	Groundwater Elevation 2/27/04[2]	Groundwater Elevation 6/21/04[2]	Groundwater Elevation 9/24/04[2]	Groundwater Elevation Nov 2004[2]	Groundwater Elevation Jan 27, 2005[2]	Groundwater Elevation Feb 21, 2005[2]	Groundwater Elevation 4/6/05[2]
PV-1	Active Residential Well	565	2.8		18.25	25.61	nm3	24.10	12.35	pumping	10.88	826.55	819.19	nm[3]	820.70	832.01	pumping	833.48
PV-2	Inactive Supply Well	331	4.0	17.30	13.64	16.26	nm3	11.40	4.32	3.84	3.99	857.66	855.04	nm[3]	859.90	866.98	867.46	867.61
PV-3	Inactive Hand Dug Well	48	0.0	nm[3]	18.70	25.91	nm[3]	23.20	12.88	10.91	10.04	825.66	818.45	nm[3]	821.16	831.92	833.89	834.76
PV-4	Recently Active Farm Well	136	2.0	nm[3]	no access	no access	29.00	27.00	17.22	14.66	13.15	no access	no access	808.15	810.15	819.93	822.49	824.00
OW-1	Observation Well	39	0	nm[3]	not built	dry	nm[3]	dry	34.76	35.22	30.28	not built	< 879.71	nm[3]	< 879.71	884.15	883.69	888.63
OW-2	Observation Well	30	0	nm[3]	not built	dry	nm[3]	dry	dry	dry	dry	not built	< 870.38	nm[3]	< 870.38	< 870.38	< 870.38	< 870.38
OW-3	Observation Well	30	0	nm[3]	not built	dry	nm[3]	dry	dry	dry	dry	not built	< 849.77	nm[3]	< 849.77	< 849.77	< 849.77	< 849.77
OW-4	Observation Well	29	0	nm[3]	not built	dry	nm[3]	dry	dry	dry	dry	not built	< 923.64	nm[3]	< 923.64	< 923.64	< 923.64	< 923.64
OW-5	Observation Well	27	0	nm[3]	not built	dry	nm[3]	dry	dry	dry	dry	not built	< 906.18	nm[3]	< 906.18	< 906.18	< 906.18	< 906.18
OW-6	Observation Well	29	0	nm[3]	not built	dry	nm[3]	dry	dry	dry	dry	not built	< 828.55	nm[3]	< 828.55	< 828.55	< 828.55	< 828.55
OW-7	Observation Well	42	0	nm[3]	not built	39.00	nm[3]	38.56	37.62	34.05	30.61	not built	819.42	nm[3]	819.86	820.80	824.37	827.81
OW-8	Observation Well	58	0	nm[3]	not built	not built	nm[3]	33.25	24.35	20.92	18.52	not built	not built	nm[3]	827.90	836.80	840.23	842.63
OW-9	Observation Well	82	0	nm[3]	not built	not built	nm[3]	46.19	33.78	30.56	25.10	not built	not built	nm[3]	831.55	843.96	847.18	852.64
Stoddard Well	Residential Irrigation Well	> 300	Not measured	nm[3]	no access	no access	nm[3]	no access	no access	no access	no access	no access	no access	nm[3]	no access	no access	no access	no access
Hendrix Hand Dug Well	Residential Irrigation Well	29	3.65	nm[3]	19.80	21.01	nm[3]	18.66	9.38	8.74	9.07	850.40	849.19	nm[3]	851.54	860.82	861.46	861.13
Parker Well	Inactive	1,400	0.7	nm[3]	65.70	64.10	nm[3]	63.09	57.50	55.75	50.98	942.96	944.56	nm[3]	945.57	951.16	952.91	957.68
J	Leach Field Exploration	21.79	1.2	nm[3]	18.35	21.00	nm[3]	17.89	10.52	10.15	10.29	858.48	855.83	nm[3]	858.94	866.31	866.68	866.54
C	Leach Field Exploration	21.44	1.7	nm[3]	19.57	Dry	nm[3]	Dry	12.00	10.52	10.04	826.83	> 823.50	nm[3]	< 823.50	834.40	835.88	836.36
D	Leach Field Exploration	22.8	1.4	nm[3]	18.82	Dry	nm[3]	23.40	11.75	11.04	10.58	835.87	> 831.00	nm[3]	831.29	842.94	843.65	844.11
E	Leach Field Exploration	19.86	1.9	nm[3]	18.58	Dry	nm[3]	18.88	10.99	9.07	8.94	819.13	> 816.41	nm[3]	818.83	826.72	828.64	828.77
Notes: 1) Measured in feet from top of casing; 2) feet mean sea level; 3) nm – not measured																		

Table 3.4-3
Estimated Groundwater Recharge for Watershed

Source of Recharge	**Rainfall Rate (ft/yr)**	**Rainfall Rate (percent)**	**Area (Acres)**	**Total (acre-ft/yr)**
Precipitation	1.25 (15”)	7%	4300	375
Precipitation-Limited by Groundwater Storage	1.25 (15”)	3.5%	4300	188
	Disposal Rate (acre-ft/yr) per Dwelling	Recharge Rate (Percent)	Number of Dwellings	Total (acre-ft/yr)
Septic Leachate	0.25	99%	533	132
Septic Leachate	0.25	95%	533	127
Upper Range of Estimate of Recharge from Precipitation and Septic				**507**
Lower Range of Estimate of Recharge from Precipitation and Septic				**315**

Note: Recharge estimates do not account for recharge from infiltration of irrigation water supplied by the Otay Water District.

Table 3.4-4
Summary of Nitrate and Total Dissolved Solids in Groundwater

Well ID	September-October 2003		February 2004		June 2004		January 2005		Samples Collected During Aquifer Test February 15, 2005 10:26 AM		February 15, 2005 4:23 PM		February 16, 2005 9:05 AM	
	Nitrate as N	TDS	Nitrate as N	TDS	Nitrate as N	TDS	Nitrate as N	TDS	Nitrate as N	TDS	Nitrate as N	TDS	Nitrate as N	TDS
	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
D	-	-	1.72	373	-	-	5.15	1,220	-	-	-	-	-	-
E	-	-	3.92	367	-	-	5.30	918	-	-	-	-	-	-
J	-	-	-	-	0.57	1,520	0.90	1,270	-	-	-	-	-	-
PV-1	12	1,300	-	-	13.2	1,120	4.59	933	-	-	-	-	-	-
PV-2	0.96	1,300	-	-	-	-	< 0.05	749	-	-	-	-	-	-
PV-3	-	-	-	-	13.2	1,120	4.93	736	-	-	-	-	-	-
PV-4	-	-	-	-	13.0	1,000	12.1	1,130	11.00	1,060	9.75	1,060	10.50	1,080
OW-7	-	-	-	-	9.47	912	14.7	546	-	-	-	-	-	-

TDS = total dissolved solids

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Table 3.4-5
Water Demand Summary and Project-Induced Groundwater Recharge Estimate

	Total Water Demand					Septic Portion of Water Demand				Recharge	Irrigation Portion of Water Demand						Recharge
												OWD Water		Ground Water			
Use	Unit of Demand	Quan.	Demand Factor (GPD/Unit) or (GPD/Ac)	Total Demand (GPD)	Total Demand (Ac-Ft/Yr)	Domestic Water Demand (GPD/Unit)	Total Domestic Water Demand (GPD)	Total Domestic Water Demand (Ac-Ft/Yr)	Domestic Demand as % of Total Demand	Recharge to Ground Water from Septic (Ac-Ft/Yr)	Irrigation Demand Factor (GPD/Unit) or (GPD/Ac)	Irrigation Demand (GPD) OWD Water	Irrigation Demand (Ac-Ft/Yr) OWD Water	Irrigation Demand (GPD) Grndwater	Irrigation Demand (Ac-Ft/Yr) Grndwater	Total Irrigation Demand as % of Total Demand	Recharge to Ground Water from Irrigation (Ac-Ft/Yr)
46 - 2-6ac. Estate Residential (New)	Residential Unit	46	2,100	96,600	108.2	210	9,660	10.8	10%	9.3	1,890	86,940	97.4	0	0.0	90%	9.7
1 - 6.7ac. Public Equestrian Facility	Equivalent Use Acreage	1	1,785	1,785	2.0	1-Res Unit + 6 Guests / Day @ 15 GPD / Guest	300	0.3	17%	0.3	1,485	1,485	1.7	0	0.0	83%	0.2
1 - 18.0ac. Portion of Private Equestrian & Polo Training Facility (Excl. Polo Field)	Equivalent Use Acreage	3	1,785	5,355	6.0	1-Res Unit + 6 Guests / /Day @ 15 GPD / Guest	300	0.3	6%	0.3	1,485	5,055	5.7	0	0.0	94%	0.6
1 - 12.8ac. Polo Field Portion of the Equestrian & Polo Training Facility	Acreage	12.8	2,232	28,570	32.0	0	0	0.0	0%	0.0	2,232	8,755	10.0	19,815	22.0	69%	1.0
1 - 3.7ac. Fire Station	Acreage	3.7	1,785	1,915	2.1	10 FT Staff @ 90 GPD + 19 PT Staff / Guests @ 15 GPD / Guest	344	0.4	18%	0.3	1,441	1,572	1.8	0	0.0	82%	0.2
TOTAL WATER DEMAND FOR OWD WATER STUDY NOT INCLUDING LOT 5 (EXISTING RANCH HOUSE)				**134,225**	**150.4**		**10,604**	**11.9**		**10.2**		**103,807**	**116.3**	**19,815**	**22.2**		**11.6**
TOTAL ESTIMATED GROUNDWATER RECHARGE INDUCED BY IMPORTING WATER (NOT INCL. LOT 5)																	**21.8**
1 - Lot 5; Currently a 4.3ac. Estate Residential (Existing Ranch House)	Residential Unit	1	2,100	2,100	2.4	210	210	0.2	10%	0.2	1,890	1,890	2.1	0	0.0	90%	0.2
TOTAL WATER DEMAND FOR OWD WATER STUDY INCLUDING LOT 5 (EXISTING RANCH HOUSE)				**136,325**	**152.7**		**10,814**	**12.1**		**10.4**		**105,697**	**118.4**	**19,815**	**22.2**		**11.8**
TOTAL ESTIMATED GROUNDWATER RECHARGE INDUCED BY IMPORTING WATER (INCLUDING LOT 5)																	**22.2**

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Table 3.4-6
Estimated Groundwater Drawdown Based on Cooper-Jacob Equation

Distance from PV-4 (feet)	Assumed Transmissivity (ft^2/min)			
	0.85		1.7	
	Assumed Storage Coefficient (dimensionless)			
	0.001	0.01	0.001	0.01
	Estimated 5-Year Drawdown (feet) Induced by Year Round Pumping Averaging 16.5 Gallons per Minute			
100	2.3	1.9	1.2	1.0
200	2.1	1.7	1.1	0.9
300	1.9	1.5	1.0	0.8
500	1.7	1.3	0.9	0.7
800	1.6	1.2	0.8	0.6
1,000	1.5	1.1	0.8	0.6
1,500	1.4	0.9	0.7	0.5
3,000	1.1	0.7	0.6	0.4

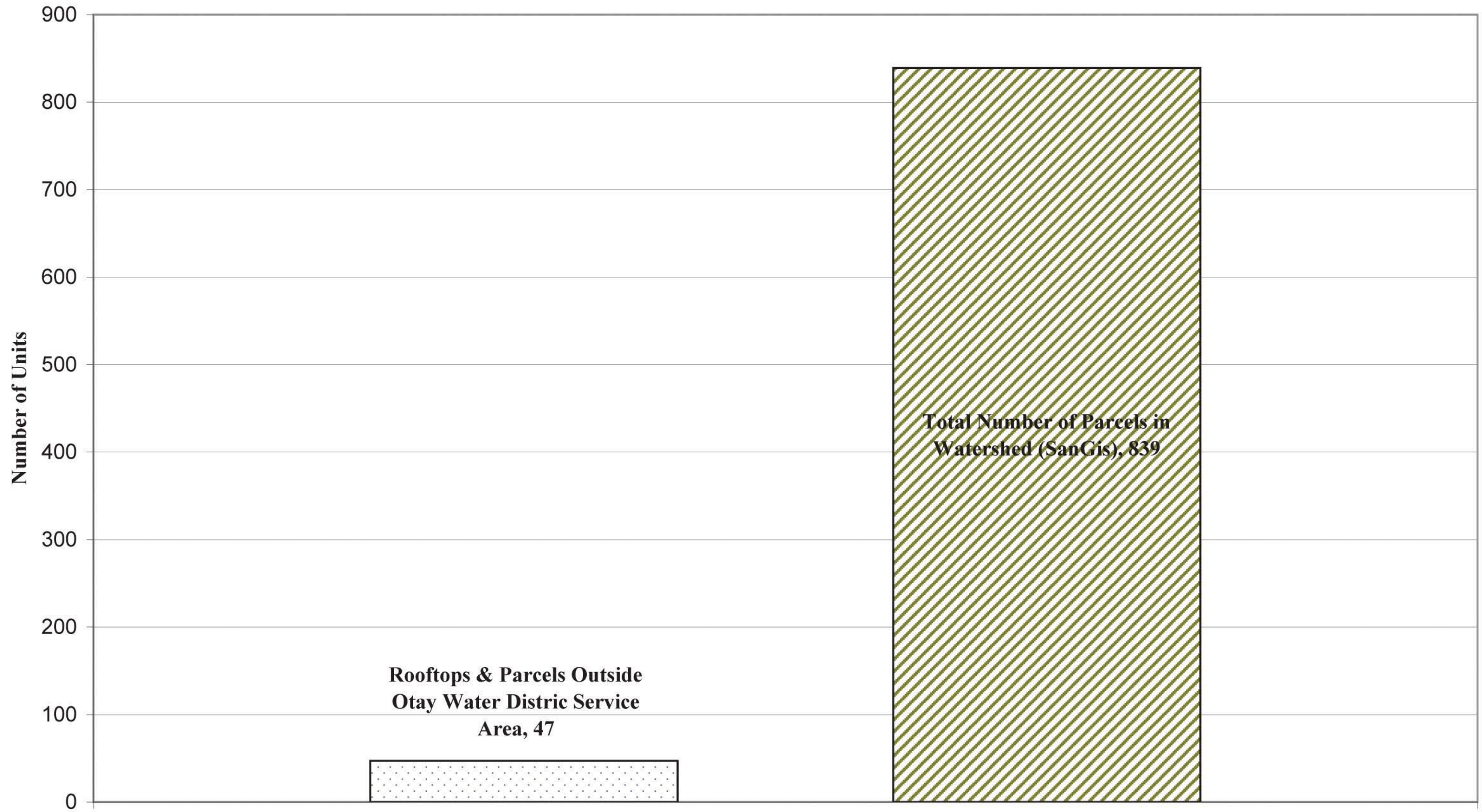
Note: Assumed pumping rate = 14.0 gallons per minute, equivalent to 22.6 acre-feet per year.

Distance from PV-4 (feet)	Assumed Transmissivity (ft^2/min)			
	0.85		1.7	
	Assumed Storage Coefficient (dimensionless)			
	0.001	0.010	0.001	0.010
	Estimated 6-Month Drawdown (feet) Induced by a 6-month Pumping Season Averaging 33 Gallons per Minute			
100	3.8	3.0	2.0	1.6
200	3.3	2.5	1.8	1.4
300	3.0	2.2	1.6	1.2
500	2.7	1.9	1.5	1.1
800	2.3	1.5	1.3	0.9
1,000	2.2	1.4	1.2	0.8
1,500	1.9	1.1	1.0	0.7
3,000	1.4	0.6	0.8	0.4

Note: Assumed pumping rate = 28.0 gallons per minute for 6-month pumping season, equivalent to 22.6 acre-feet per year.

Table 3.4-7
Properties in the Watershed with Applications Pending

No. on RBF Exhibit	Project Name*	Total Acreage	Proposed Land Use	Proposed No. of Lots	Water Source	Method of Wastewater Treatment/Disposal
1	Jamul Indian Village Casino Development Project	101	–	–	Otay	Septic
2	TPM 20599 RPL1	6.2	SF Residential	4	Otay	Septic
3	TPM 20868	5.14	SF Residential	2	Otay	Septic
4	P03-101	–	Telecom Facility	–	–	-
5	TM 5154 RPL1	11.2	SF Residential	5	Otay	Septic
6	Jamul Highlands TM 52689 RPL2	60	SF Residential	23	Otay	Septic
7	Rancho Jamul Estates II	223	SF Residential	68	Otay	Septic



Source: Wiedlin and Associates, Inc.

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Estimated Number of Groundwater Dependent Parcels

Peaceful Valley Ranch EIR

Figure 3.4-1

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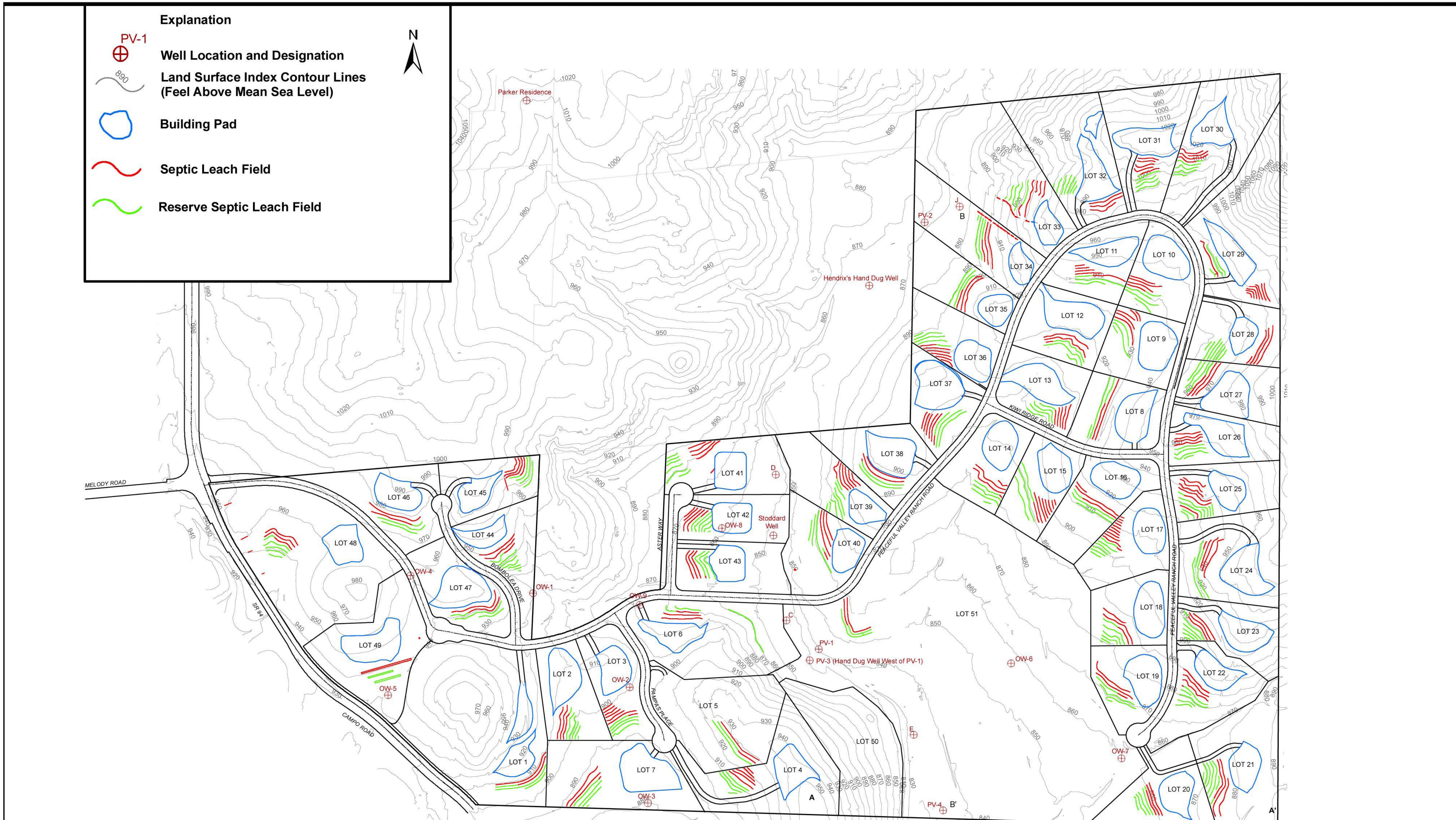

SOURCE: Wiedlin and Associates, Inc.

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Not to Scale

Site Well Locations

Peaceful Valley Ranch EIR

Figure 3.4-2

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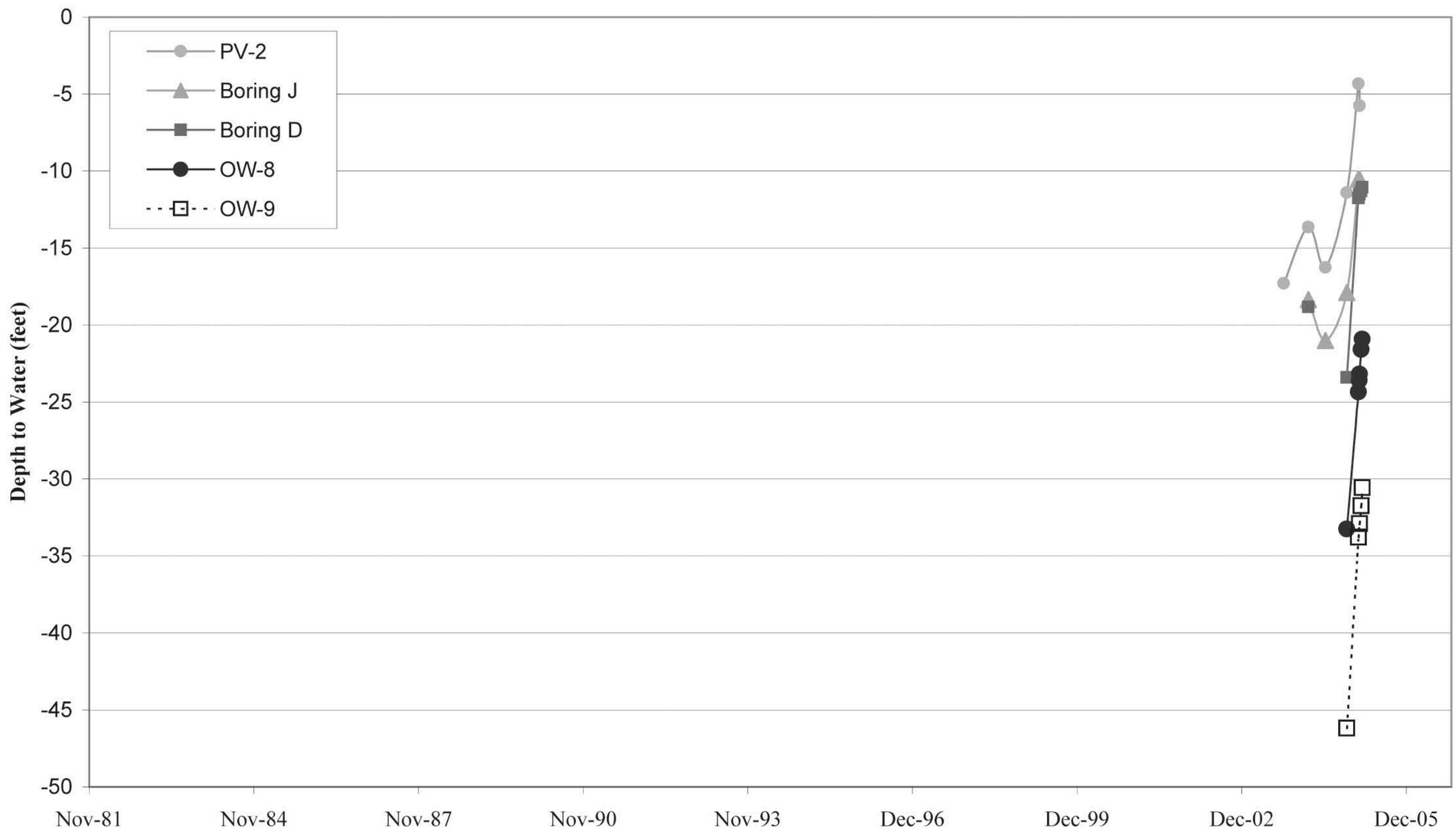

Source: Wiedlin and Associates, Inc.

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On Site Groundwater Level Fluctuations

Peaceful Valley Ranch EIR

Figure 3.4-3

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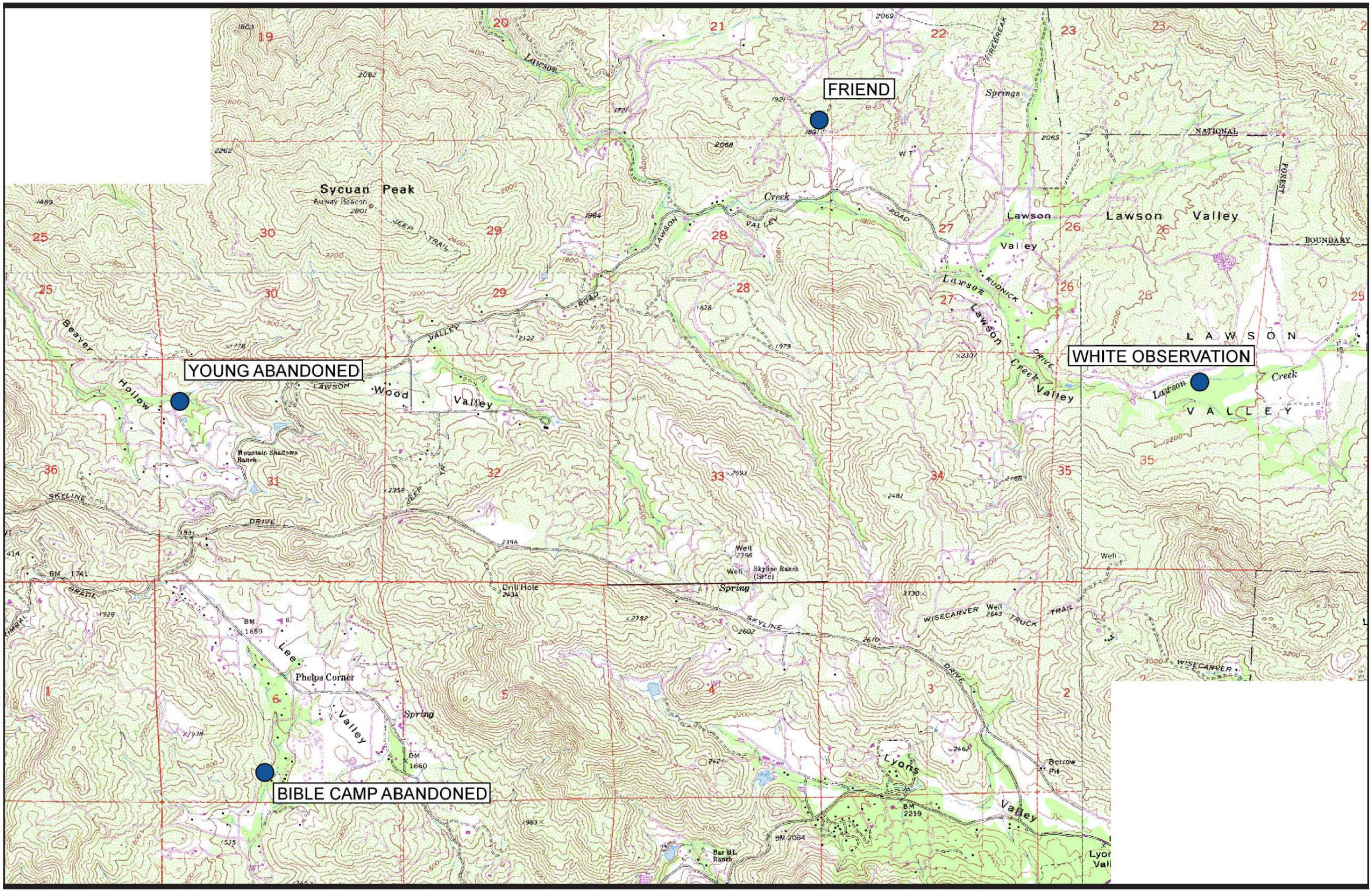

Source: Wiedlin and Associates, Inc.

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Jamul Area Well Locations

Peaceful Valley Ranch EIR

Figure 3.4-4

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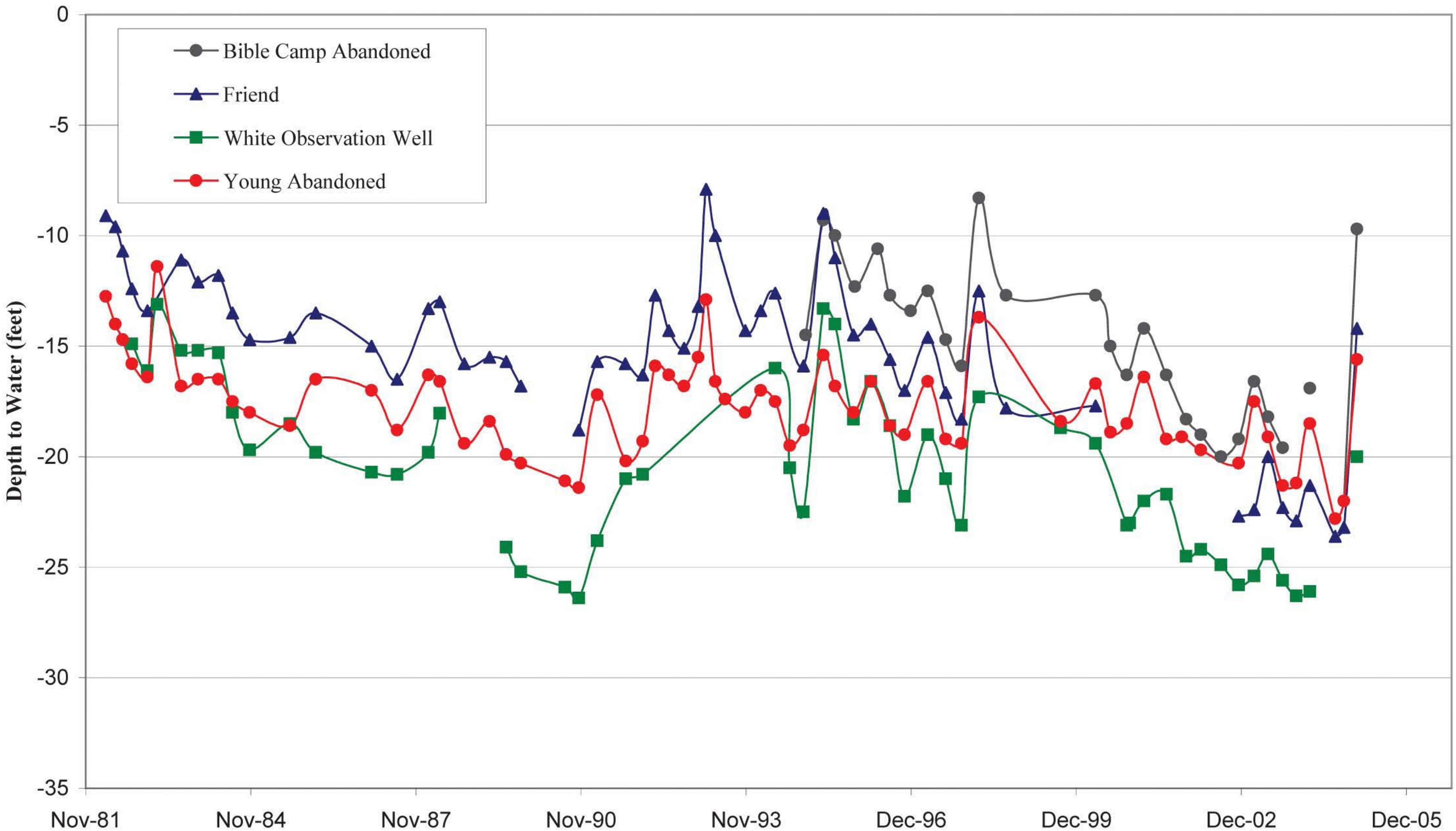

Source: Wiedlin and Associates, Inc.

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Long Term Groundwater Level Fluctuations

Peaceful Valley Ranch EIR

Figure 3.4-5

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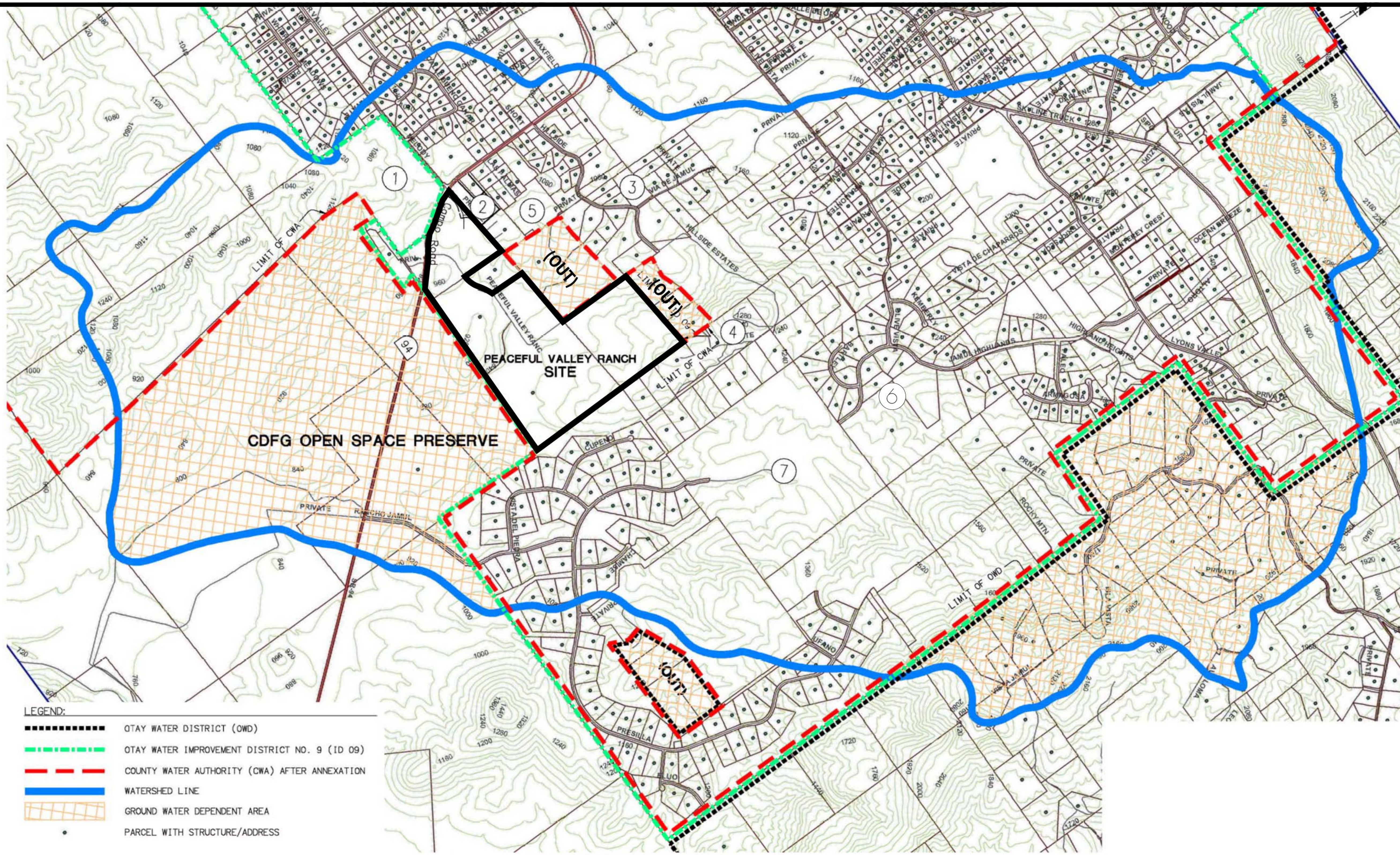

DISCRETIONARY PROJECTS - PENDING DPLU REVIEW

No. on RBF Exhibit	Project Name	Total Acreage	Proposed Land Use	Proposed No. of Lots	Water Source	Method of Wastewater Treatment/Disposal
1	Jamul Indian Village	101	-	-	OTAY	SEPTIC
2	TPM 20599 RLP1	6.2	SF RESIDENTIAL	4	OTAY	SEPTIC
3	TPM 20868	5.14	SF RESIDENTIAL	2	OTAY	SEPTIC
4	P03-101	-	TELECOM FACILITY	-	-	-
5	TM 5154 rlp1	11.2	SF RESIDENTIAL	5	OTAY	SEPTIC
6	Jamul Highlands TM 52689 RPL2	60	SF RESIDENTIAL	23	OTAY	SEPTIC
7	Rancho Jamul Estates II	223	SF RESIDENTIAL	68	OTAY	SEPTIC

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Not to Scale

Groundwater Dependent Areas

Peaceful Valley Ranch EIR

Figure 3.4-6

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